1977

Salinity preference of the milkfish Chanos chanos Forskal

Juario, J. V.

Aquaculture Department, Southeast Asian Fisheries Development Center

Juario, J. V., & Dueñas, C. (1977). Salinity preference of the milkfish Chanos chanos Forskal. SEAFDEC Aquaculture Department Quarterly Research Report, 1(2), 14-16.

http://hdl.handle.net/10862/2301

Salinity preference of the milkfish *Chanos chanos* Forskal

J. V. Juario and C. Dueñas

Fry of the milkfish *Chanos chanos* are traditionally captured at a length of 11-14 mm along the shoreline and transported to brackish water fishfarms where they are grown to market size. The fry that are not captured presumably return to sea and are not seen again. Several variations of this pattern occur and there are well documented reports that some fry enter river-lake systems and spend their first year or two in the lake and return to the sea as sexually immature fish. There are other reports that some fry stay for a time in mangrove swamps.

As an aid to the milkfish aquaculture, several investigations have been made on the salinity tolerance of milkfish fry and fingerlings (Juliano and Rabanal, 1963; Anon. 1972, 1973a and 1973b) but no salinity preference studies have been made on milkfish fry. In order to better understand the physiology of this species, a study has been initiated to determine the salinity preference of newly captured fry and possible changes in their preference with age.

For this study, 312 milkfish fry, collected from the shore waters at Hamtik on 6 October 1976, were used. Upon arrival of the fry at Pandan, these were placed and left overnight in a large aerated glass aquarium containing seawater at a salinity of 32 ppt. On the following day, 78 of the fry were transferred to an aerated glass aquarium (30 cm x 15.5 cm x 20 cm) containing water at a salinity of 3 ppt. A second, third and fourth groups of 78 fry were maintained in three other identical aquaria but at salinities of 10, 20, and 32 ppt. These fry were fed daily with a combination of *Chlorella* sp. and *Brachionus* sp. at 1430 hours and 3/4 of the water in each aquarium was changed every other day at 0800 hours.

The salinity preference experimental tanks were glass aquaria (36 cm x 18 cm x 25 cm) laboratory. A 7.5 cm layer of seawater ($S = 32$ ppt) was placed at the bottom of the experimental tank. A 7.5 cm layer of 16 ppt diluted seawater was then floated on top of the former layer. A layer of 22.5 cm of water at one salinity was placed in a second aquarium which served as the control. The distribution of experimental and control tanks was arranged in a random manner.

Four tests were conducted every other day for the first week, every third day for the second week and again every other day for the third week. The tests were conducted after acclimatizing the fry to four different salinities for 5 days. Test 1 was conducted with fry acclimatized at 32 ppt; test 2, with fry acclimatized at 20 ppt; test 3, with fry acclimatized at 10 ppt and test 4, with fry acclimatized at 5 ppt. For each test, 4 fry were placed in each of the experimental and control aquaria. One hour later, observations on the position of the fry in each of the 8 aquaria were recorded once every 2 min. This was repeated 10 times with a 30-min pause between the fifth and the sixth observation. The whole observation period lasted for 3-1/2 hours. A total of 720 distribution observations was obtained for each seawater concentration used for acclimatization (8 fish per observation x 10 observations per fish per replication x 9 replications). Salinities of each water layer was determined after each test, surface temperatures before and after the tests recorded and the fry removed, measured and preserved in 5% seawater formalin.

Upon introduction of fry into the experimental and control tanks, it was observed that they immediately swam to the bottom of the tank. On reaching the bottom, they appeared to be very confused. However, they quickly calmed down and it was assumed that the 1-hr adjustment period was more than sufficient for recovery from the stress of handling and introduction into new surroundings.

Table 1. Distribution of milkfish fry in control and experimental aquaria; numbers 1, 2, 3 in control aquaria correspond to 8 ppt, 16 ppt, 32 ppt, respectively, in experimental aquaria.

		Fry Accilimatized to 5 ppt						Fry Acclimatized to 10 ppt						Fry Acclimatized to 20 ppt						Fry Acclimatized to 32 ppt					
		Control			Experimental			Control			Experimental			Control			Experimental			Control			Experimental		
Layers		1	2	3	8 ppt	16 ppt	32 ppt	1	2	3	8 ppt	16 ppt	32 ppt	1	2	3	8 ppt	16 ppt	32 ppt	1	2	3	8 ppt	16 ppt	32 ppt
Replicate	1	20	6	14	1	8	31	22	1	17	2	1	37	32	3	5	4	1	35	26	9	5	1	0	39
	2	19	6	15	35	0	5	30	4	6	7	6	27	16	8	16	14	3	23	21	9	10	8	9	23
	3	17	4	19	2	5	33	27	5	8	1	1	38	16	6	18	5	2	33	24	1	15	16	4	20
	4	5	3	32	3	13	24	26	3	11	6	0	34	11	5	24	13	7	20	14	6	20	0	4	36
	5	31	4	5	15	10	15	22	1	17	15	10	15	16	0	24	17	3	20	8	7	25	9	5	26
	6	5	7	28	21	7	12	21	3	6	9	3	28	12	1	27	4	5	31	7	5	28	5	4	31
	7	36	1	3	13	7	20	26	3	11	15	4	21	30	1	9	33	2	5	25	5	10	30	1	9
	8	15	2	23	9	14	17	29	2	9	14	7	19	18	9	13	32	4	4	13	3	24	18	6	18
	9	13	3	24	8	3	29	12	6	22	24	13	3	14	5	21	14	4	22	3	5	32	15	7	18
Total		161	36	163	107	67	186	215	28	117	93	45	222	165	38	157	136	31	193	141	50	169	102	40	218

Results of this study are presented in Table 1. The chi-square values obtained are all highly significant at the .05 level. This means that the milkfish fry which were acclimatized to different salinities have preference for a certain salinity. Looking at the total for the experimental as well as for the control series, one can see that all fry, regardless of the salinity in which they were acclimatized, show a salinity preference for 32 ppt. On the other hand, the majority of the fry in the control tanks usually prefer to stay either at the bottom or at the uppermost layer; only a few stay at the middle layer. This strongly suggests that milkfish fry that are not caught along the shore by fishermen usually tend to migrate to waters of high salinity. Furthermore, apparently salinity preference of milkfish fry does not change with age. On the other hand, similar studies on other species of fish (Baggerman, 1960, 1963; Otto & McInerney, 1970; Hain, 1975; Schulz, 1975) have shown that salinity preference is functionally related to the individual's physiological state.

Literature Cited

Anon. 1972. Salinity tolerance of bangus. Animal Husbandry and Agricultural J. **7**(8):28. Cited by Librero et al., 1975.

Anon. 1973a. Salinity tolerance of bangus. In: Inland Fisheries Project, Philippines, Technical Report No. 3, Second half FY 1973-74, NSDB assisted Project No. 2.235 (Jan. 1 – June 30, 1973): 29-34.

Anon. 1973b. Bangus transfer from one salinity to another. In: Inland Fisheries project, Philippines. Technical Report No. 3, second half FY 1973–74, NSDB assisted project No. 2.235 (Jan. 1 – June 30, 1973): 70–75.

Baggerman, B. 1960, Salinity preference, thyroid activity and the seasonal migration of four species of Pacific Salmon (Oncorhynchus). J. Fish. Res. Bd. Canada **17**(3): 295–322.

Baggerman, B. 1963. The effect of THS and antithyroid substance on salinity preference and thyroid activity in juvenile Pacific Salmon. Can. J. Zool. **41**:307–319.

Hain, J. H. W. 1975. The behaviour of migratory eels. *Anguilla rostrata* in response to current, salinity and lunar period. Helgolaender wiss. Meeressunters. **27**:211–233.

Juliano R. O. & H. R. Rabanal. 1963. The tolerance of milkfish fingerlings and fry, *Chanos chanos* (Forskal) to decreases in salinity. Copeia, **1**:180—181.

Otto, R. G. & J. E. McInerney. 1970. Development of salinity preference in pre-smolt Coho Salmon, *Onchorhynchus kisutch.* J. Fish. Res. Bd. Canada.

Schulz, D. 1975. Salinitaetspraeferenzen bei Glasaalen und Jungen Gelbaalen *(Anguilla anguilla).* Helgolaende wiss. Meeresunters. **27**: 199–210.